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AUTHOR Roderman, Winifred Ho; Booth, Gerald
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ABSTRACT

The Science in Action series is designed to teach practical science concepts to special-needs students. It is intended to develop students' problem-solving skills by teaching them to observe, record, analyze, conclude, and predict. This document contains a student workbook which deals with basic principles of life science. Six separate units include: (1) living things called animals; (2) a look at the animal kingdom; (3) different kinds of bodies; (4) animal life cycles; (5) animal lifestyles; and (6) animals in danger. The units consist of basic introductory information and questions, worksheets, a self-checking quiz, and instructions for experiments. A cumulative test is provided at the end of the workbook, along with a glossary. The teachers guide (which is included) explains how to use the workbook, together with teaching suggestions and enrichment activities for each unit. (TW)

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Animals

Life Science in Action

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Animals

by Winifred Ho Roderman and Gerald Booth

Science consultants

Katharine Barrett
Director of Biology Education
Lawrence Hall of Science
University of California
Berkeley, California

John Bartavian
Science Teacher
Mt. Eden High School
Hayward, California

Gilbert Yee
California Teacher of the Year
Fremont, California

Contents

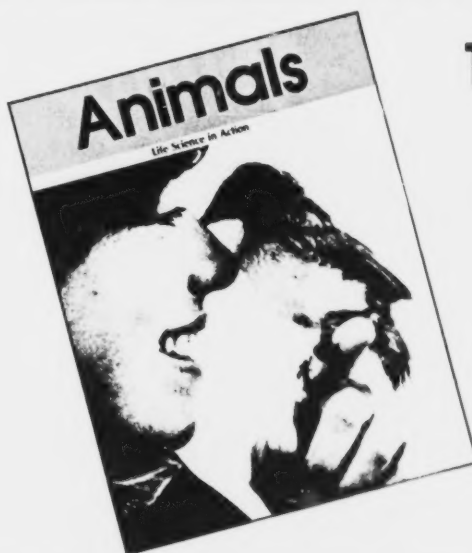
Introduction	3
Unit 1 Living Things Called Animals	4
Unit 2 A Look at the Animal Kingdom	9
Unit 3 Different Kinds of Bodies	21
Unit 4 Animal Life Cycles	28
Unit 5 Animal Lifestyles	34
Unit 6 Animals in Danger	42
Show What You Learned	46
Glossary	47

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Teacher's Manual

Animals

Winifred Ho Roderman and
Gerald Booth

A Janus Life Science in Action Book

Teacher's Manual written by Winifred Ho Roderman

OVERVIEW

Real-Life Science

We wrote **Animals** for the older adolescent with reading and learning problems. Through interesting activities and easy-to-understand lessons, students discover that science is a living part of their lives.

Students learn about main kinds of animals, from sponges to mammals. They discover how they as humans fit into the animal kingdom, what all animals need to survive, and how a species can become endangered. Students are encouraged to raise and care for an animal and to observe it the way a naturalist might.

Helping the Slow Learner Succeed

Zoos and nature centers, movies, TV shows, and illustrated magazines—all have interested your students in animals at one time or another. *Animals* capitalizes on that curiosity and provides a learning framework slow learners can handle.

Most lessons are just one page long, short enough for students to finish in a reasonable amount of time. Concepts are presented progressively and in small steps. Students gradually build up skills as they work through the book.

Animals is part of a set of Janus **Life Science in Action** workbooks. This workbook can be used as a supplement to or as the core of your science program, and can help students meet general science graduation requirements. (Other sets in the Janus **Science in Action** series are **Physical Science in Action** and **Earth Science in Action**.)

OBJECTIVES OF THIS WORKBOOK

The Janus *Science in Action* series helps special-needs students learn basic and practical science concepts that they can apply to daily living. The series also helps students develop problem-solving skills by teaching them to observe, record, analyze, conclude and predict.

Objectives of *Animals* are to help students:

- learn that all animals are living things with certain needs and traits;
- become familiar with the major phyla of animals;
- learn how different kinds of animals are suited to survive and reproduce;
- learn about different kinds of animal life cycles;
- learn how scientists observe and study animals;
- apply learning by caring for and observing an animal of their choice;
- build a vocabulary of science words that describe animal traits and behavior.

READABILITY

Average reading level for *Animals* is below 2.5 according to the revised Spache Readability Formula. Target words that can help students understand concepts are listed under "Teaching the Units" in this manual. Those words are set in boldface type whenever they first appear in the text, and are defined in the glossary at the end of the workbook.

We suggest you review target words before students work on a unit. Help them pronounce the words and encourage them to look up definitions in the glossary.

HOW TO USE THIS WORKBOOK

The Workbook Format

Animals is formatted so students can recognize what to do in each unit.

All units open with a brief introduction that focuses students on the concepts to be learned. The introductory page includes topic questions that preset learning, and a short vocabulary exercise, "Before You Start," that helps students read the lessons in the unit. Each lesson is followed by an activity or exercise that reinforces the concepts taught.

Most units end with "Check Yourself," a comprehension exercise, and "Check These Out," a list of activities that expand the lessons. Those activities are multi-modal so that each of your students can complete at least one of them successfully.

Introducing the Book

Post pictures of different kinds of animals around the classroom. Show a film about animals. Then, lead students in a discussion: Remind them that humans are also animals, and ask how humans are like the animals in the pictures and movie.

Distribute the workbook, and encourage students to leaf through the pages and comment on the attractive illustrations. Then, read the introduction out loud.

Introducing the Unit

Ask a student to read the unit introduction out loud. Discuss the topic questions, and ask students to guess answers.

Direct students next to "Before You Start." Walk students through the exercise, and help them find the words in the glossary.

Teaching Suggestions

Make Learning Fun

Studying about animals can be enjoyable for students and teacher. The subject lends itself to all sorts of interesting activities. But students will need your firm guidance to keep them on course and complete the workbook. Therefore, pace students together as you move them through the workbook.

Have students read each lesson out loud. Encourage discussions to make sure students understand concepts. Spend time on photographs and illustrations. They'll elicit many stories—including some myths and tall tales—from your students. You'll find that a wonderful opportunity to lead students into a variety of research and enrichment activities, and to demonstrate that fact can be stranger than fiction.

Be Prepared!

We can't stress enough how important it is to be organized and prepared.

Read each unit before you assign it, and bring in pictures that illustrate the concepts taught in that unit. Also bring in objects students can handle and examine, such as shells, feathers, skeletons, and prepared specimens. (You can order specimens and other classroom study aids from biological supply houses. Names of a few organizations are included under "Teaching Aids" at the end of this manual.)

The workbook requires students to observe live animals. To help students successfully do those assignments, we suggest you keep a small zoo in your classroom of animals that are easy to care for, such as ants, guinea pigs, snakes, spiders, turtles, earthworms, caterpillars, and fish. You'll need to know how to care for and make suitable habitats for those animals—and for the other animals your students are sure to bring into the classroom.

To find out, look for appropriate how-to books at pet stores, zoos and nature centers, and in the juvenile section of your local library. You might also inquire at the science education department of a nearby college for the names of publishers to write to.

End-of-the-Book Exercises

A page of two brief comprehension tests ends the workbook. "What's the Answer?" tests students' comprehension of major concepts. "What's the Word?" tests their knowledge of some target words.

About the Glossary

Words that appear in boldface type in the text are defined in the glossary at the end of the workbook. Words are listed alphabetically and divided into syllables. Definitions are narrow to help your special-needs students understand the science concepts taught in *Animals*.

TEACHING THE UNITS

Unit 1: Living Things Called Animals

Target Words: *classify, scientific name, traits*

Earth has a bewildering variety of living things. In this unit, students learn that scientists describe an animal according to traits it has in common with other animals.

PAGE 5: What Is an Animal?

Most scientists divide living things into two main groups (kingdoms), called plants and animals. The main distinctions between the two kingdoms are: Most animals can move freely while plants are rooted in one place; plants make their food through photosynthesis (from water, air, and sunlight) while animals must obtain and eat plants or other animals.

Students are asked to compare the body of a bird with that of a human. Answers might be: They have two eyes and a mouth; they have a skeleton; they have similar internal organs.

PAGE 6: Animal Traits

Students learn that scientists classify animals by the animals' physical and behavioral traits. You'll need to help students understand how the system of classification works: An animal is compared with groups of other animals until it can't be compared anymore. The animal is then classified (grouped) according to the traits it shares with other animals, and the traits it alone has.

The activity asks students to group animals. Encourage students to think of useful categories—examples: animals that have a voice; that can walk; that eat plants; etc.

PAGE 7: What Kind of Animal Are You?

Students are asked to compare themselves (humans) to other animals. Some traits in common might be: eats meat; has hair; has babies; breathes air.

PAGE 8: Check Yourself

Across 1. eat 5. Homo sapiens 7. oxygen

Down 2. animal 3. classify 4. traits

5. human 6. move

Enrichment Activities

- Take your students fishing.
- Show students a classification chart of humans that contains the seven main categories: kingdom, phylum, (and subphylum for vertebrates), class, order, family, genus, and species. You might want to compare human classification with that of another animal.
- Have students invent an animal, give it traits, classify it according to categories they decide, and make up a name for that animal. (First, find out how scientists arrive at names for their discoveries.) Students can draw pictures of what that animal should look like.
- Show skeletons of animals that are closely related, such as birds and lizards. Have students discuss how the two animals are alike and different.

Unit 2: A Look at the Animal Kingdom

Target Words: *body cavity, circulatory system, class, digestive system, exoskeleton, segments, structure, tentacles, vertebrate, warm-blooded*

Scientists divide all animals into about 25 phyla. In this unit, students learn about six well-known phyla and one subphylum (vertebrates). Remind students that a phylum is a very large group and that many classes of animals can belong in it. Consult publications, such as outlines of zoology, to find out about each group as you teach the unit. Students will ask surprising questions.

PAGE 10: Sponges

Students learn that sponges are simple animals whose bodies are essentially digestive sacs. They are attached to the ocean floor and don't move about

freely like other animals. Water, bearing food, enters the sponge's body through its pores; water leaves through the body's top opening.

PAGE 11: Coelenterates

Jellyfish, sea anemones, and corals are classes of coelenterates. Those animals are like the sponge in that their bodies are also essentially digestive sacs, and many are attached to the ocean floor. The jellyfish differs, however, by having a mouth, tentacles, and the ability to move freely.

PAGE 12: Worms

Students now start learning about animals whose bodies are no longer simple. Direct students to the diagram of the earthworm. Unlike sponges and coelenterates, this animal has a digestive tract with openings at two ends of its body. It also has many parts, such as the hearts and blood vessels that make up its circulatory system.

Students are asked to draw a live earthworm. Be sure to have some on hand.

PAGE 13: Mollusks

Mollusks are an important food for people all over the world. Other mollusks, besides those named in the text, are mussels, oysters, scallops, and various sea or freshwater snails. Some mollusks (besides octopuses) that do not have outside shells are squid and slugs.

Students are asked to cut a squid in half and draw the inside of its body. You might wish to demonstrate this activity. We suggest you dissect a frozen squid for ease of handling.

PAGE 14: Arthropods

Arthropods make up a very large phylum. Important traits are: jointed legs, segmented body, and an exoskeleton. The three segments of the bee's body are head, thorax, and abdomen.

Students are asked to examine an arthropod such as an ant, fly, or spider and to draw it. You might wish to substitute crayfish, crabs, and shrimp.

PAGE 15: Echinoderms

Unless you live close to an ocean, echinoderms will be difficult to observe alive. Fortunately, their exoskeletons are easy to obtain from souvenir shops and biological supply houses.

Students are asked to examine and draw an echinoderm.

PAGES 16-17: Chordates and Vertebrates

Students learn about the phylum and subphylum they belong in, and the seven classes of vertebrates.

Fishes make up three classes (lampreys and hagfish, cartilaginous fishes—sometimes called primitive bony fishes—and bony fishes). All live in water.

Other examples of amphibians are frogs. Of reptiles: alligators, lizards. Of birds: robins, bluejays, chickens, ostriches, turkeys. Of mammals: dogs, horses, rats, seals, otters, chipmunks, lions, kangaroos, gorillas.

PAGES 18-19: **Animal Watch**

In this activity, students get a taste of how a naturalist might study an animal. Students observe a live animal, research its phylum and class, describe its traits, conclude what other animals are closely related to it, and draw a picture of it.

Help students find the references they need to do this activity. You might wish to select an animal for all your students to observe, lead them through the investigation, discuss their findings, then have students fill in the pages together.

PAGE 20: **Check Yourself**

1. d. arthropods
2. f. chordates and vertebrates
3. c. mollusks
4. a. coelenterates
5. b. segmented worms
6. e. echinoderms

Enrichment Activities

- Have students observe different kinds of live animals. Visit zoos (look for special exhibits, such as insect habitats), natural science museums, aquariums, nature centers, and animal farms.
- With students, start a classroom nature center where students can display interesting specimens, articles they find, projects they complete, etc.
- Post a schedule of nature shows students can see on TV. Assign students to report on different programs.
- Have students find out how animals in each phylum are important to humans. They can give oral reports, make posters, or put together scrapbooks for the classroom nature center.

Unit 3: Different Kinds of Bodies

Target Words: *predator, prey, specialized*

This unit teaches students that different animals have different kinds of bodies, and those bodies are specialized so the animals can survive.

PAGE 22: **Different Ways to Breathe**

All animals need oxygen, and they obtain it either from air or water. Specialized body parts bring oxygen into animal bodies.

The cat and human breathe air into lungs. The bee and grasshopper breathe air into their bodies through holes (spiracles) on their abdomen. The whale and human breathe air into their lungs. The eel and fish breathe water into their gills.

PAGE 23: **Different Ways to Eat**

All animals must eat food, and different animals eat different things. Students learn that suckers such as mosquitoes have a needle-like proboscis; insect eaters such as woodpeckers have pick-like beaks and long tongues; carnivores have sharp, tearing teeth; herbivores have cutting and grinding teeth; omnivores have tearing, grinding, and cutting teeth. You might wish to discuss how animals' digestive systems also differ

according to the foods they eat. (The cow, for example, has four stomachs.)

Some animals with teeth like the dog: cat, alligator, wolf, shark. With teeth like the squirrel: chipmunk, rabbit, beaver. With teeth like the horse: cow, ox, buffalo, zebra. Humans are omnivorous and have different teeth for cutting (incisors), tearing (canines), and grinding (molars).

PAGE 24: **Built to Get Food**

Many animals eat other animals. Specialized sense organs help them find their prey; other specialized body parts give them the speed and strength to catch and overcome other animals. The hawk's eyes are highly specialized and can spot very small animals far below on the ground.

PAGE 25: **Built to Get Away**

Students learn that specialized body parts keep animals safe from predators. Hard coverings such as quills, tough skin, and shells protect soft bodies. The turtle, when threatened, withdraws tightly into its armor-like shell.

Students also learn about mimicry: Some animals keep safe by looking like other animals or by blending into their surroundings.

PAGE 26: **Animal Watch**

Students observe an animal and discover how it is specialized to get oxygen, obtain and eat food, and keep safe from predators.

PAGE 27: **Check Yourself**

1. c. parts that help it get food.
2. e. keeps it safe from enemies.
3. d. oxygen from water.
4. f. get oxygen from air.
5. a. eat only certain kinds of food.
6. b. body parts such as sharp teeth.

Enrichment Activities

- Have students name an animal they think is very successful at surviving, and discuss how its specialized body parts allow it to do so. (Examples: shark, cockroach, turtle, ant.)
- With the class, invent an animal. Decide whether it lives in air or water, what it eats, and who its enemies are. Then give it traits that help it survive.
- Discuss a food chain, starting with small organisms and moving up to humans. Students can then make posters illustrating the food chain.
- Have students make clay or papier-mache models of animals with interesting specialized bodies. (Examples: elephant, alligator, stork.)

Unit 4: Animal Life Cycles

Target Words: *develop, fertilize, life cycle, reproduce, stage*

This unit teaches students some ways animals reproduce, start life, and develop into adults.

PAGE 29: Starting Life

Students learn that animals reproduce asexually and sexually. In sexual reproduction, an egg cell is fertilized by a sperm cell, then develops into an organism. Some animals lay eggs that those organisms develop in and hatch out of when they reach a certain stage. Other animals develop inside the mother's body and are born.

Birds lay eggs; mammals give birth; reptiles lay eggs, insects lay eggs.

PAGE 30: Growing Up

Some animals emerge from the egg or mother's body with essentially the same kind of bodies they will have as adults. As they mature, they become bigger and develop sexually. Examples of such animals are mammals, reptiles, and birds.

PAGE 31: Changing Bodies

Students learn about metamorphosis, during which the young animal's body changes completely as it develops into an adult.

1. The first stage of the frog's life cycle is the egg.
2. The animal hatches and is called a tadpole.
3. The tadpole develops legs and its tail begins to disappear.
4. The adult frog has four legs; large eyes, nose and mouth; and now eats other animals.

PAGE 32: Another Kind of Metamorphosis

Students learn about complete metamorphosis, during which the animal hatches from an egg, goes through a larva stage, becomes a pupa, then emerges as an adult. Students are asked to compare the adult's body with that of the larva.

PAGE 33: Check Yourself

Across 2. adult 4. metamorphosis 6. budding

7. sex 8. life cycle 9. reptile

Down 1. mammal 3. reproduce 5. develop

Enrichment Activities

- Have students find out the life cycles of other animals, such as the crab, grasshopper, mosquito, and oyster. Students then make posters illustrating those life cycles.
- Obtain photographs of a chick hatching and developing into an adult. Mount the photographs on poster board and have students write captions.
- This unit provides the teacher with an opportunity to discuss human reproduction in a scientific and non-threatening framework. Focus on: what happens to the cell as it is fertilized; as it divides to form other cells, organs, and body parts; how the mother's body protects and nurtures the developing fetus; how the baby is born.

Unit 5: Animal Lifestyles

Target Words: *behave, behavior, instinctive behavior, learned behavior, species, symbiosis, survive*

All animals have specific patterns of behavior. Students learn that animal behavior is also specialized to help animals survive.

Students may need help with this unit. Put nature books and magazines around the classroom for students to browse through. *Ranger Rick* and *National Wildlife* (available at your local library) are good choices; both magazines are filled with excellent visually-informative color photos.

PAGE 35: How Animals Behave

All animals seem to know how to do certain things instinctively, such as mate and bear young. But some animals must learn behaviors that help them survive—hunting and hiding from enemies, for example. They learn from others of their kind and from trial and error. A few animals can also be trained to behave in ways unusual for their species. Students are asked to give examples of instinctive, learned, and trained behaviors.

PAGE 36: Different Ways to Live

Students learn that some animals roam and some have homes that they return to regularly. Animal homes range from simple bedding-down places, to caves, to elaborate many-room affairs.

Point out to students that humans are animals that build homes, and their homes (like those of the pocket gopher) have entrances, halls, and many rooms that are used for specific purposes: storing food, sleeping, etc.

PAGE 37: What's for Dinner

Animals find food by searching for it, hunting it, or trapping it. Help students think of animals that hunt.

An animal that raises plants and animals for food is the human.

PAGE 38: Bringing Up Baby

Some animals can survive as soon as they enter the world. Others must be cared for by the parent until they are big enough to find their own food. Some of those animals are: all mammals, all birds, the alligator, the scorpion. Humans care for their young until the offspring is old enough to leave home. In American society, that's about 18 years of age; in other societies, the age may be younger.

PAGE 39: Getting Along

Animals interact with other animals in a variety of ways. Some live solitary lives, except when they mate and raise young. Some live in groups, and some live in societies. Students also learn about symbiosis. The animal that lives with many different kinds of animals is the human.

PAGE 40: Animal Watch

Students are asked to observe the behavior of a wild animal in its environment. Students who live in densely populated cities might look for small animals in public parks and in buildings.

PAGE 41: Check Yourself

1. instinctive 2. learned 3. move 4. hunt
5. survive 6. societies

Enrichment Activities

- Plan a field trip to a place, such as a circus or a marine life amusement park, where students can observe trained animals.
- Read a book about animals out loud to your class. Authors might be Joy Adamson (*Elsa; Born Free*), Farley Mowat (*Never Cry Wolf*), Gerald Durrell (*Ark on the Move*), Gavin Maxwell (*Ring of Bright Water*), Sterling North (*Rascal*).
- If there is a public TV station in your area, write to its education department for materials.
- Attempts are being made by scientists to teach a language to apes and dolphins. Have your class research those efforts while developing problem-solving skills. How would they go about finding that information? Where would they start?
- Have students select an animal (from those discussed in class) and find out how it cares for its young.

Unit 6: Animals in Danger

Target Words: *balance, endangered, environment, extinct*

In this unit, students investigate how a species can become extinct.

PAGE 43: The Right Conditions

An animal can survive successfully when it lives in a balanced environment. In such an environment, animals die in about the same number as animals are reproduced.

When the balance is upset, some animals will die too quickly to be replaced in sufficient numbers. Sometimes, animals will multiply too quickly—for example, when large predators in an area are killed off—and then getting enough food becomes a problem. The animals become sickly, bear weak young, and may die out.

PAGE 44: Endangered Species

In nature, environments change very slowly, and animals have time to adapt to the changes. With the advent of humans and technology, environments can now change quickly and radically. As a result, some species have become or are in danger of becoming extinct. Students learn about four endangered animals in the United States (and in American waters). Animals described are: 1. humpback whale 2. bald eagle 3. grizzly bear 4. timber wolf.

PAGE 45: Animal Watch

Students choose an endangered animal to find out about.

Enrichment Activities

- Have students write to government agencies (see "Teaching Aids") for a list of endangered animals. They can then make posters of those animals to hang in the classroom nature center.
- Invite an environmentalist to talk to the class.

- The U.S. government prohibits foreign goods made from certain endangered animals from entering the country. Have students find out which agency is the watchdog, then write to it for information.
- Students may become interested in working with animals. Have them find out about jobs. Some zoos, science museums, and animal hospitals will accept student volunteers and train them to help care for animals. If there are places near you, have students inquire about volunteer work.

Show What You Learned

PAGE 46: What's the Answer?

1. a. Must eat food; b. Most can move freely.
2. a. Has an outside skeleton. 3. a. Bring oxygen into its body; b. Keep it safe from predators; c. Help it find food. 4. a. Budding; b. Laying eggs; c. Giving birth to young. 5. a. Building a nest; c. Learning to talk. 6. b. Its environment is polluted; c. It is overhunted by predators.

PAGE 46: What's the Word?

1. Classify 2. Traits 3. Survive 4. Predator 5. Life Cycle 6. Behave

TEACHING AIDS

Resources

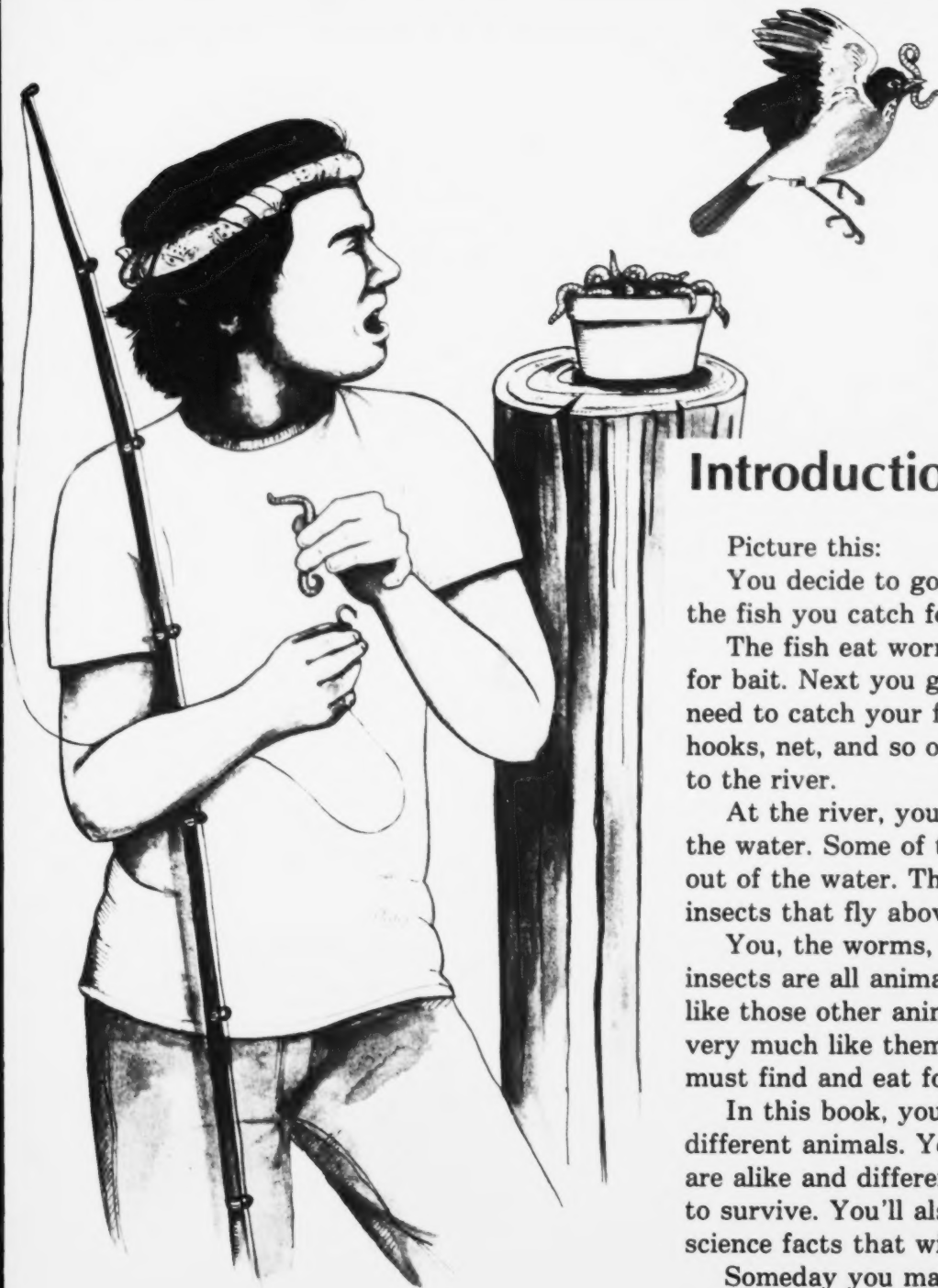
- Agency for Instructional Television, Box A, Bloomington, IN 47401
- Lawrence Hall of Science, University of California, Berkeley, CA 94720
- U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC 20240

Supply houses for prepared slides, frogs, etc:

- Carolina Biological Supply Co., 2700 York Rd., Burlington, NC 27215
- Fisher Scientific Co., Educational Materials Div., 4901 West Lemoyne Ave., Chicago, IL 60651

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Introduction

Picture this:

You decide to go fishing. You will eat the fish you catch for dinner.

The fish eat worms, so you get some for bait. Next you get the things you'll need to catch your fish — fishing pole, hooks, net, and so on. Then you go down to the river.

At the river, you see fish swimming in the water. Some of them suddenly jump out of the water. They catch and eat insects that fly above the water.

You, the worms, the fish, and the insects are all animals. You don't look like those other animals, but you are very much like them. For one thing, you must find and eat food to stay alive.

In this book, you'll learn about many different animals. You'll learn how they are alike and different, and what they do to survive. You'll also learn interesting science facts that will surprise you.

Someday you may want to raise animals. You may need to get rid of animal pests. You may want to watch wild animals to learn about them. You'll be able to do those things if you understand what certain animals need and how they act.

This book can help you find out.



Unit 1

Living Things Called Animals

Earth is different from other planets in one very important way: Many, many kinds of things can live on it. Some of those things we call *plants*. Some we call *animals*.

Animals live almost everywhere on Earth. Some even live inside other animals. No one knows how many different kinds of animals there are. So far, scientists have studied about a million different kinds. But new kinds are always being found.

- When is a living thing called an animal?
- How do scientists describe an animal?

You'll find out in this unit.



Before You Start

You'll be using the science words below. Find out what they mean. Look them up in the Glossary that's at the back of this book. On the lines below, write what the words mean.

1. **classify** _____

2. **traits** _____



What Is an Animal?

Millions and millions of different kinds of living things are on Earth. Scientists divide those living things into groups. What are the two main groups?

Right! The two main groups are *plants* and *animals*.

How do scientists decide when a living thing is an animal? They see if that living thing has the *traits* of an animal. What traits do you think animals have?

Animals have these traits:

- Animals can move themselves. Most of them can also move from place to place.
- Animals must eat food. They must also get water and oxygen or they will die.

Many kinds of animals are very different from each other. Their bodies don't look alike. And they don't act in the same ways. But many other kinds of animals are very much alike. Their bodies look different, but they all have certain traits.

Look at the human and the bird in the picture. They have two legs. That is a trait both animals have. How else is the human's body like the bird's body?

Animal Traits

Think of a cat. Now think of a dog. Both are different kinds of animals. Yet both have traits that are the same. What is one trait that cats and dogs have?

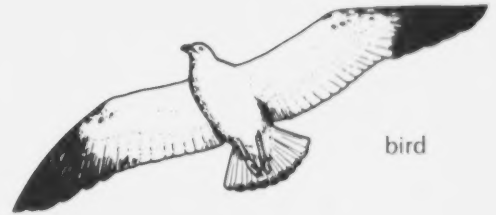
Cats and dogs also have traits that are different. What is one trait that cats have that dogs don't?

Scientists do just what you did when they study an animal. They study its traits. They see which traits are like other animals'. And they look for traits that belong to it alone. They say an animal is a certain kind (such as a cat) when it has traits no other kind has.

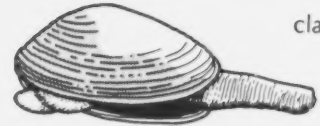
Scientists *classify* animals by their traits. They say that animals with the same traits make up a group. For example, animals with skeletons inside their bodies make up one group. Animals without such skeletons make up another group.

The pictures on these pages show some kinds of animals. How might you group them? Think of some traits those animals have. Write each trait. Then make up groups: Write all the animals in the pictures that have each trait. Some animals will be in more than one group. (One is done.)

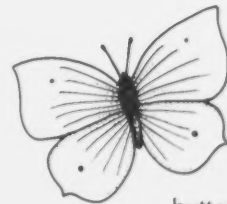
1. trait: lives in water
animals: clam, fish
2. trait: _____
animals: _____
3. trait: _____
animals: _____
4. trait: _____
animals: _____
5. trait: _____
animals: _____



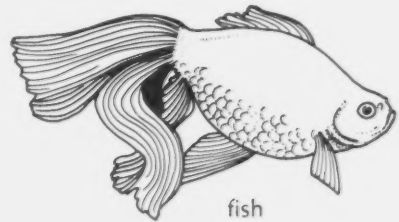
bird



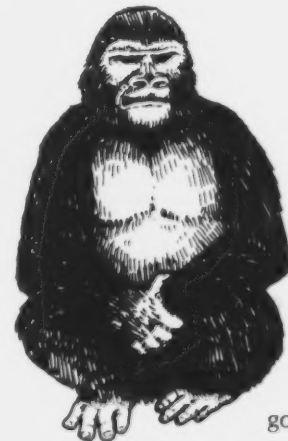
clam



butterfly



fish



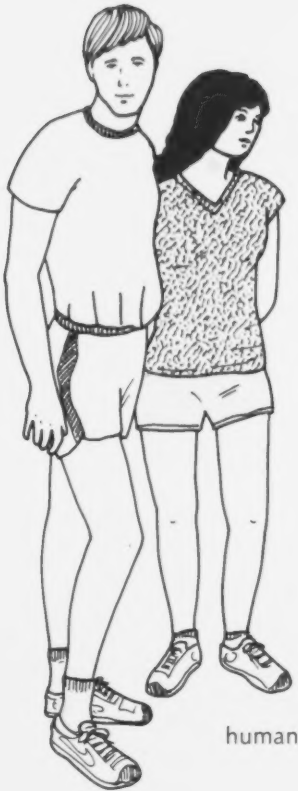
gorilla

What Kind of Animal Are You?

Now think about yourself. You are a *human*. What traits do humans have that other animals have?

Think of traits that describe your body. For example: *Has an inside skeleton*. Think of traits that describe the ways you act. For example: *Lives in homes that are built*. Then think of other animals that have those traits too. (You can choose animals that are not in the pictures.)

Write each trait. Then write some animals that also have that trait.

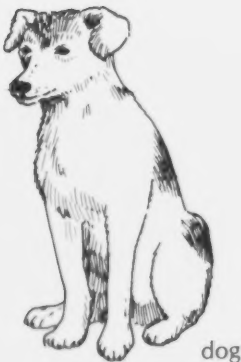


human

1. trait: _____
animals: _____
2. trait: _____
animals: _____
3. trait: _____
animals: _____
4. trait: _____
animals: _____
5. trait: _____
animals: _____

Think About It

When scientists study a kind of animal, they give it a **scientific name**. All scientists then use that name when they talk about that animal. Do you know the scientific name for humans? If you do, write it here.



dog

Answer

The scientific name for humans is *Homo sapiens*.

Check Yourself

Use words from this unit to do the crossword puzzle. The words you'll need are listed below. The first one is done.

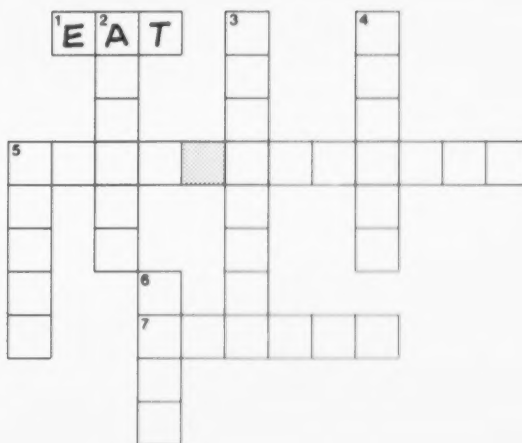
animal	eat	move
classify	Homo sapiens	oxygen
	human	traits

Across

1. Animals _____ food.
5. Your scientific name is _____.
7. All animals need food, water, and _____.

Down

2. You are an _____.
3. Scientists _____ animals in groups.
4. All animals have some _____ that are alike.
5. You are a _____.
6. Most animals can _____ from place to place.



Check These Out

1. What are the traits of living things? Find out. Give a talk about the differences between a rock, a plant, an animal.
2. Make a poster that shows the groups humans can be classified in. Paste pictures of other animals that also belong in those groups.
3. Animals are one *kingdom* of living things. Scientists say there are two or three more. Find out what they are.
4. Make your own *system of classification* and classify the people in your building or school.
5. Make a list of traits that belong just to you.

6. As you work through this book, you may want to find out more about animals. You can find out more by looking in an encyclopedia or by getting books about animals in the library. You can also talk to an expert, such as a zoologist, naturalist, or veterinarian.

Here are some things you may want to find out:

- Who was Linnaeus? What is his system of classification?
- What are the smallest living things? What do they look like?
- How do scientists name animals?
- Who are the Leakeys (Louis, Mary, and Robert)? What did they discover?



Unit 2

A Look at the Animal Kingdom

You learned that scientists study an animal by describing its traits. Then they classify that animal into several groups. One of those groups is called a *phylum*.

A phylum is made up of many different kinds of animals. But all those animals have some important traits that are the same. Scientists divide all the animals on Earth into about 25 *phyla*. (Phyla means more than one phylum.) Each phylum has its own special traits.

- What are the main phyla of animals?
- What are some animals in the main phyla?
- What are some traits of the main phyla?

You'll find out in this unit.

Before You Start

You'll be using the science words below. Find out what they mean. Look them up in the Glossary. On the lines below, write what the words mean.

1. body cavity _____

2. class _____

3. structure _____

Sponges don't move from place to place. They attach themselves to rocks and other things.



Sponges

Sponges belong to the phylum *porifera*. Sponges don't move around like many animals. They live attached to rocks and other things.

The sponge is a *simple* animal. That means it has few body parts. Its body is like an empty sack. The inside of the sack is its body cavity.

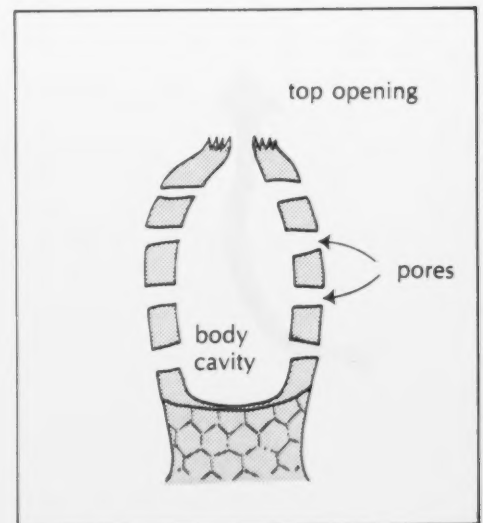
Look at the diagram of the sponge's body. See how its body is like a sack? What else do you notice about the sponge's body?

It's full of *pores* (holes). That's why the sponge phylum is called *porifera*. *Porifera* means "having holes." Pores are a trait of the phylum.

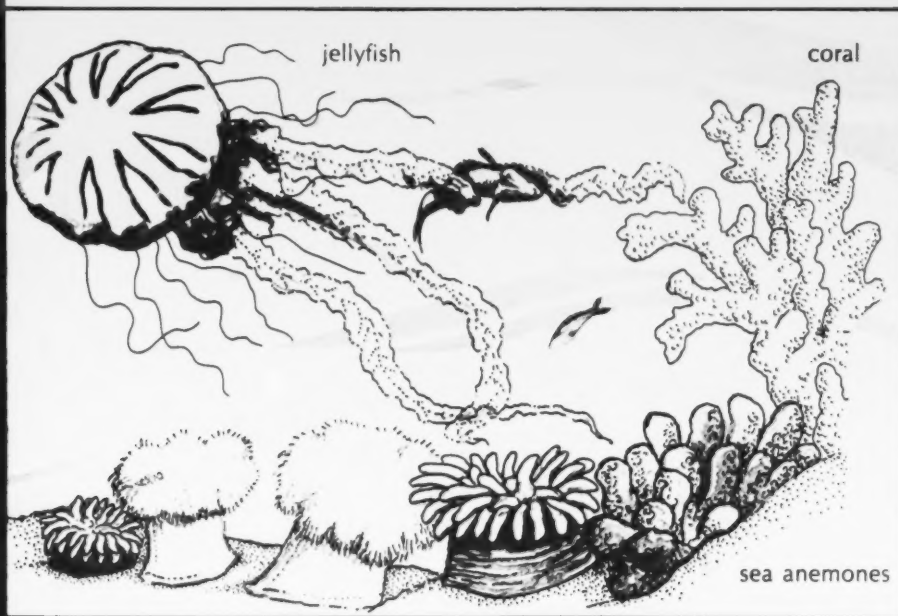
A sponge doesn't have a mouth or teeth. How do you think it gets food?

Here's how: Sea water is full of tiny animals. Those animals are food for the sponge. The sponge pulls the water into its body. It traps the animals inside its body. Then it pushes the water out.

Look at the diagram of the sponge again. It shows that water goes in through the pores. Write *in* next to the arrow that shows water going in. Write *out* next to the arrow that shows water going out. What does it go out through?



The body of a sponge



The jellyfish, coral, and sea anemone are three kinds of coelenterates. Which of those animals can move from place to place?

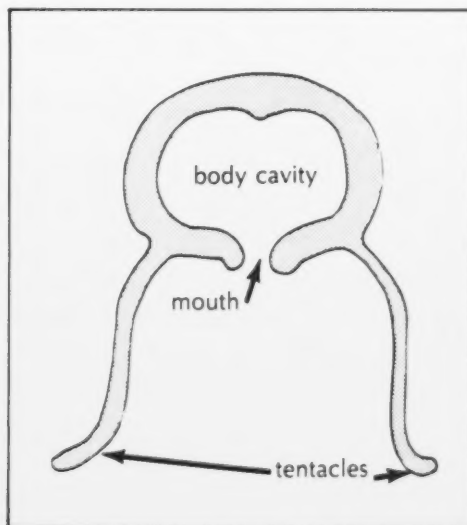
Coelenterates

Jellyfish, sea anemones, and corals look very different on the outside. But inside, they are very much alike. That's why they belong in the same phylum: *coelenterate*. Jellyfish, sea anemones, and corals belong to different *classes*. A class is a group of animals in the same phylum.

Some people call coelenterates *stinging cell animals*. That's because they have **tentacles** that can sting. Those tentacles are used like arms.

The coelenterate uses its tentacles to catch food. It spreads out its tentacles in the water. It stings and stuns the fish that swim into its tentacles. Then it wraps its tentacles around the fish and pulls the fish into its mouth.

Look at the diagram of a jellyfish's body. How is the jellyfish's body like the sponge's body?

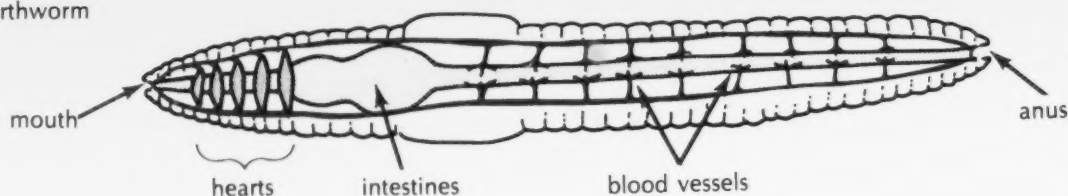


The body of a jellyfish

How is it different from the sponge's body?

Now, look at the pictures at the top of these pages. How else is the jellyfish different from the sponge?

The body of an earthworm



Worms

You learned that animals with simple bodies have very few parts. Now you'll learn about animals whose bodies are not simple. Worms are some of those animals.

Flatworms, *roundworms*, and *segmented worms* are three phyla of worms. Flatworms have long flat bodies. Most flatworms are *parasites* that live inside the bodies of other animals. Most roundworms are also parasites. What do you think a roundworm's body is shaped like?

That's right. Roundworms have bodies that are long and round.

Segmented worms have bodies that are made up of **segments** (small sections). They also have more kinds of body parts than the animals you have studied so far. Earthworms are segmented worms. Look at the diagram of the earthworm's body.

What parts does the earthworm have that the jellyfish doesn't?

The earthworm has special parts for handling food. The *mouth* takes food into the body; the *intestines* digest food; and the *anus* pushes out wastes. Those parts make up the earthworm's **digestive system**.

The earthworm also has two kinds of parts that move blood through its body. Those parts make up its **circulatory system**. Look at the diagram. What are those parts?

Now look at a live earthworm. Draw the earthworm's body in the space below. Be sure to show the segments.

Animal: earthworm

Mollusks

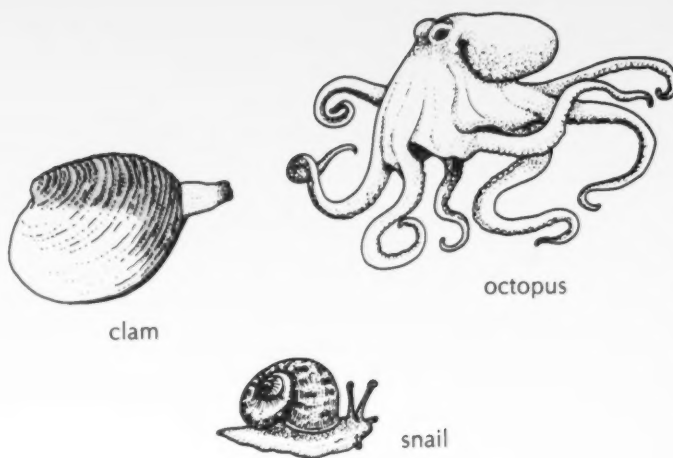
This next group of animals belongs to the *mollusk* phylum. *Mollusk* means "soft body." Clams, octopuses, squid, snails, and slugs are mollusks. They all have these traits: soft body, big foot or tentacles, digestive and circulatory systems.

Mollusks live in many different places. Some live in fresh water or salt water. Some live in mud or sand. And some live on dry land. Look at the pictures of the mollusks. Which mollusk lives on land?

Snails live on land. Octopuses and clams live in water.

Most mollusks have hard shells that protect their soft bodies. Mollusks such as snails have one big shell. Mollusks such as clams have two shells.

But some mollusks don't have an outside shell at all. The octopus is an example of such a mollusk.



What other mollusks do not have outside shells?

You can study the body of a mollusk. Get a squid from a fish market. Cut it open. Then draw what the inside of the squid is like.

The body of a squid

Arthropods

A spider, a bee, and a crayfish — how are they alike? Look closely at the pictures above. What body parts do all those animals have that mollusks and worms don't have?

Right. They have *legs*.

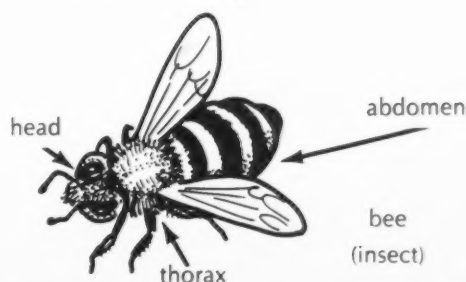
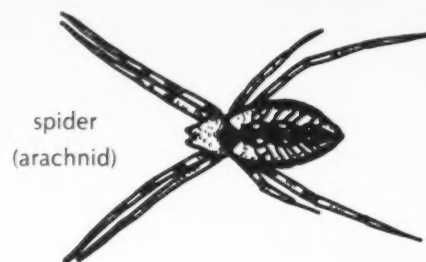
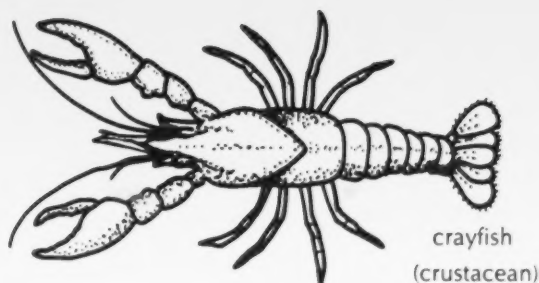
The animals in the picture belong to the largest animal phylum — *arthropod*. *Arthropod* means "jointed legs." Those animals have legs that are made up of several parts.

Suppose you touched a crayfish. Would its body be hard or soft?

Its body would be hard. All arthropods have an **exoskeleton** — hard outside covering. *Exoskeleton* means "outside skeleton." It holds up the arthropod's body, just as the skeleton inside you holds up your body.

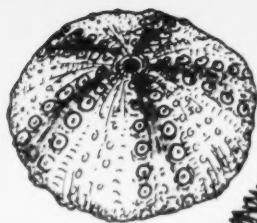
Arthropods also have segmented bodies. For example, spiders have bodies with two main segments. Insects have bodies with three segments. Look at the picture of the insect (the bee). The front segment is the *head*. The middle segment is the *thorax*. What is the last segment?

Many arthropods live where people do. Ants, flies, and spiders are some of those arthropods. Catch an arthropod and look at it through a hand lens. Draw it in the space at the right. Next to *Animal*, write the arthropod's name. Then write some of the traits that arthropods have.

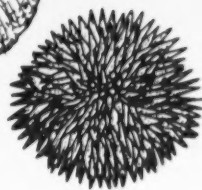


Animal: _____

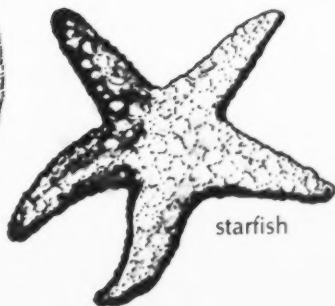
Traits: _____



sea urchins



sand dollar



starfish

Animal: _____

Echinoderms

The animals in the *echinoderm* phylum live in the sea. Sea urchins, starfish, and sand dollars belong in that phylum. Those animals all have a covering that is hard and tough. That tough covering is a trait of echinoderms. In fact, *echinoderm* means "spiny skin."

Look at the pictures of the starfish and sand dollar. How are their bodies alike?

Did you notice that both bodies have a five-part pattern? A five-part body pattern is also a trait of echinoderms.

You can find starfish on rocks or walls in the sea. If you try to pick one up, it will be hard to pull off. Starfish have many small *tube feet* on their arms. Those tube feet are like small suction cups. They stick tightly to things. Tube feet are another trait of echinoderms.

The starfish feeds on mollusks such as oysters and clams. How do you think it gets inside their hard shells?

The starfish wraps itself around a mollusk. It sticks its tube feet on the shells. Then it slowly pulls on the shells until they open a little.

The starfish next pushes its stomach outside its body. It puts its stomach inside the mollusk's shells. Its stomach then digests the mollusk's body.

Choose an echinoderm. Draw it in the box at left. Be sure to show its five-part body pattern. Next to *Animal*, write the echinoderm's name.

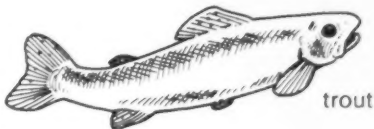
Chordates and Vertebrates

The *chordate* phylum is the one you belong in. Chordates are animals that have a cord down their backs at one time in their lives. The phylum is divided into groups called *subphyla*. Chordates that have a backbone make up the **vertebrate** subphylum. So, you are also a vertebrate.

Vertebrates have these traits: They

have a skeleton inside their bodies and a brain inside a skull. They have a body cavity that has organs in it. They have a head, neck, body, and sometimes a tail. Their heads have two eyes, a nose, and a mouth.

Scientists divide vertebrates into seven classes. The pictures show some of the classes.



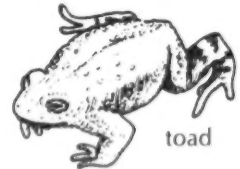
trout

Fishes

There are three classes of fishes. One class is made up of fish that have no jaws. The second class is made up of fish like the shark. And the third class is made up of fish like the trout. Where do all three fish classes live?



salamander



toad

Amphibians

Amphibians live both in water and on land. They have thin, moist skins that can dry out. So they must be close to water. Toads and salamanders are amphibians. So is an animal that looks a little like a toad. What is that animal?



snake



crocodile

Reptiles

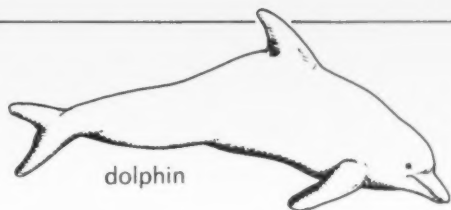
Reptiles usually live on land. Their skins are dry and covered with scales. They keep the animals from drying out. Snakes, turtles, and crocodiles are reptiles. What other animal is also a reptile?



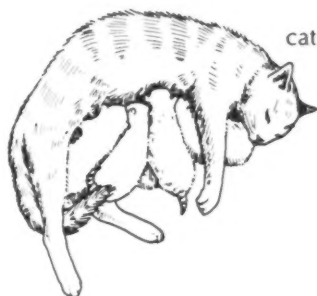
bluejay

Birds

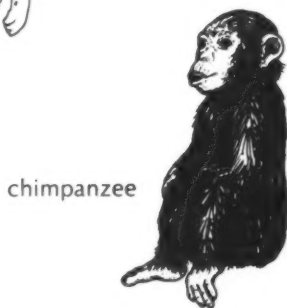
Birds live on land, and most of them can fly. Birds are **warm-blooded**. They can live in very cold and warm places. Birds have beaks, wings, and scaly legs and feet. They are covered with feathers. What is one example of a bird?



dolphin



cat and kittens



chimpanzee

Mammals

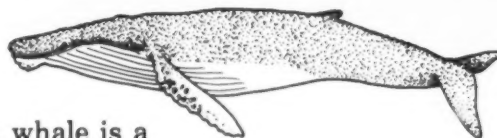
The mammal class is the one you belong in. All mammals have these traits: They are warm-blooded. They are covered with hair. All but one mammal give birth to young. And all feed their young milk. That milk is made in the mother's body.

Most mammals live on land, but a few live in the sea. The dolphin and the seal are examples of sea mammals.

There are many different kinds of mammals. Some are tiny, such as the mouse. And some are large, such as the elephant. What are some other mammals?

Which Vertebrates?

Which classes do these vertebrates belong in? Take a guess. Write *fish*, *amphibian*, *reptile*, *bird*, or *mammal*. Then check your answers. (The right answers are upside down.)



1. A whale is a



2. An eel is a



3. A lizard is a



4. A frog is an

5. A penguin is a



Answers

1. mammal 2. fish 3. reptile
4. amphibian 5. bird

Animal Watch

Choose an animal that you can take care of and study. It can be an animal that you keep in school. Or it can be an animal that you care for at home.

Now find out all you can about that animal. Get some books from the library. Talk to experts such as naturalists and veterinarians. Then answer these questions.

1. What animal is it? Write its name. (Examples: hamster, cat, dog.)

2. What phylum or subphylum does it belong in? Draw a circle around your answer.
sponge worm arthropod
coelenterate mollusk vertebrate
3. What are some traits of its phylum or subphylum? (Example: Sponges have holes in their bodies.)

4. What class does it belong in? (Examples: insect, spider, mammal, fish, amphibian, reptile, bird.)

5. What are some traits of its class? (Example: Insects have segmented bodies.)

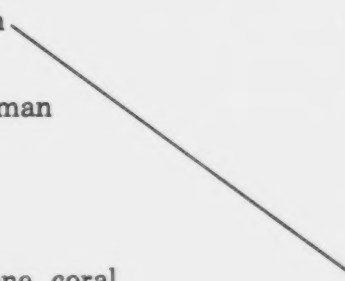
6. What other animals are most like that animal?
(Example: Dogs, wolves, and coyotes are most like each other.)

7. In the space below, draw the animal. Show the traits of that animal's phylum. (Example: Insects have six legs. Spiders have eight legs.) Show a trait of the animal's class. (Example: Mammals are covered with hair.)

Animal: _____

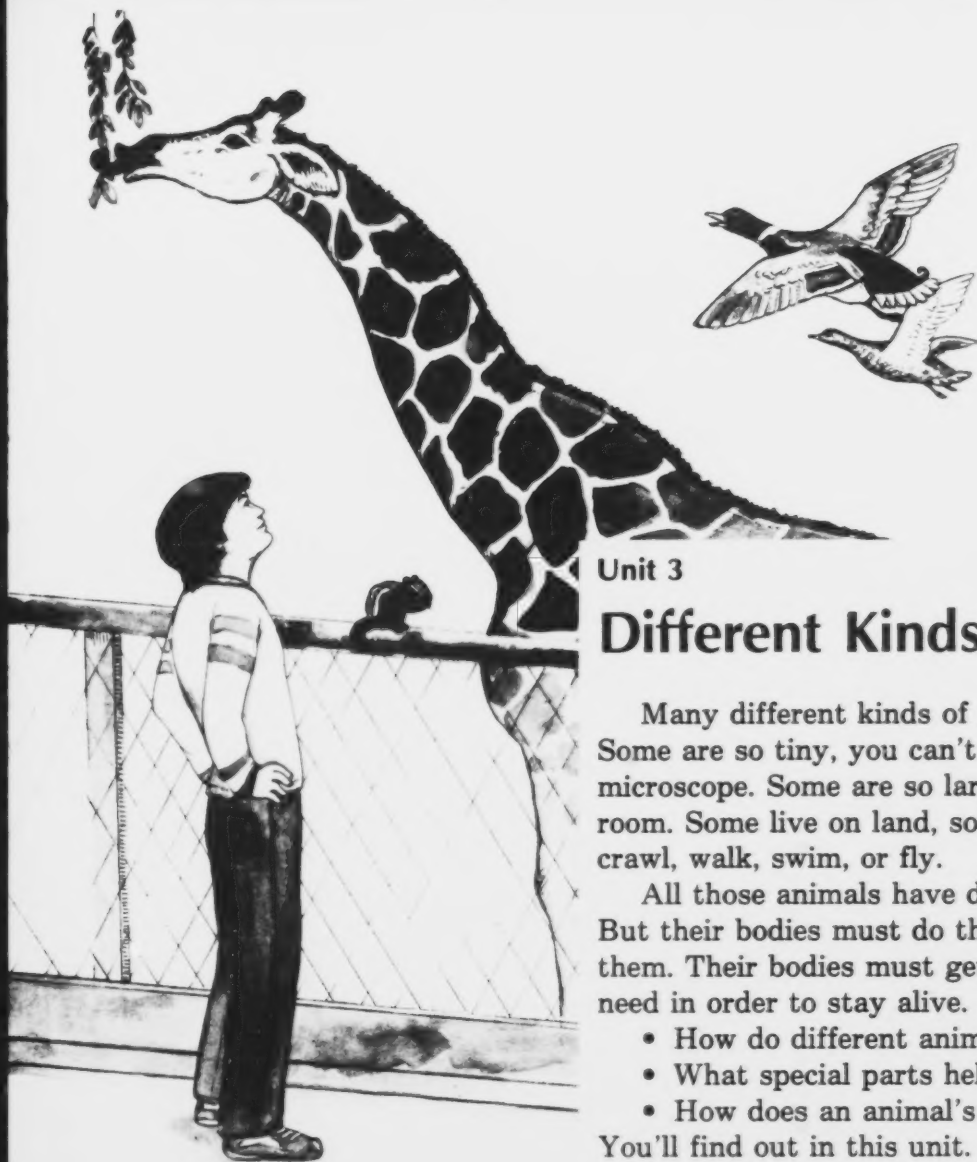
Check Yourself

What phylum do these animals belong in? (Hint: Think about the phylum's traits. One is given.) Draw a line from the animals to the right phylum. The first is done.

- | | |
|--------------------------------------|---|
| 1. spider, bee, crayfish | a. coelenterates
(trait: stinging cell) |
| 2. shark, elephant, human | b. segmented worms
(trait: digestive system) |
| 3. clam, squid, slug | c. mollusks
(trait: soft body) |
| 4. jellyfish, sea anemone, coral | d. arthropods
(trait: jointed legs) |
| 5. earthworms | e. echinoderms
(trait: spiny skin) |
| 6. sea urchin, starfish, sand dollar | f. chordates and vertebrates
(trait: backbone) |
- 

Check These Out

1. Invite a veterinarian to speak to your class. Ask him or her what kinds of jobs you can get in animal care.
2. What are organ systems? Find out what organ systems you have. Give a report about one organ system to your class.
3. As a class, get a preserved frog from a science store. Dissect (cut open) the frog and study its different organ systems. Draw one of those systems.
4. Make a poster. Pick one of the seven classes that are part of the vertebrate subphylum. Find and cut out pictures of animals that belong to the class. (Look in magazines and newspapers.)
5. Do you live near an ocean? Find out when the low tides are, and visit a tidepool. Draw or write the names of the animals that you see.
6. Here are more things you may want to find out:
 - Where do zoos get wild animals such as tigers?
 - What are some animals that live in the deserts? The mountains? The tropics? At the North or South Pole?
 - How are the lamprey and shark different from other fish?



Unit 3

Different Kinds of Bodies

Many different kinds of animals live on Earth. Some are so tiny, you can't see them without a microscope. Some are so large, they would fill up a room. Some live on land, some live in water. They crawl, walk, swim, or fly.

All those animals have different kinds of bodies. But their bodies must do the same things for all of them. Their bodies must get the things all animals need in order to stay alive.

- How do different animals get oxygen?
- What special parts help them find and eat food?
- How does an animal's body keep it safe?

You'll find out in this unit.

Before You Start

You'll be using the science words below. Find out what they mean. Look them up in the Glossary. On the lines below, write what the words mean.

1. **predator** _____

2. **prey** _____

3. **specialized** _____

Different Ways to Breathe

Animals need oxygen to live. They get oxygen from air or water. So, all animals have *specialized* body parts that bring oxygen into their bodies.

Most animals that live in water have parts called *gills*. Water goes into their bodies and passes through those gills. The gills then take oxygen from that water.

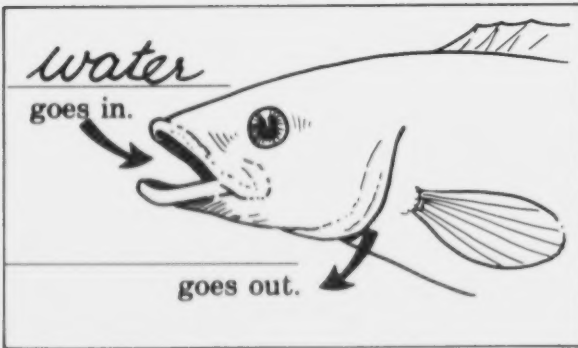
Animals that live on land get oxygen from air. Many of them have parts called *lungs*. Those animals breathe air into their bodies. Then the lungs take oxygen from that air.

Some animals that get oxygen from air don't have lungs or gills. Insects are an example. They breathe through small holes on the sides of their body. Those holes are connected to long tubes that go inside the insect's body. Air goes through the holes and into the tubes. The tubes take oxygen from that air.

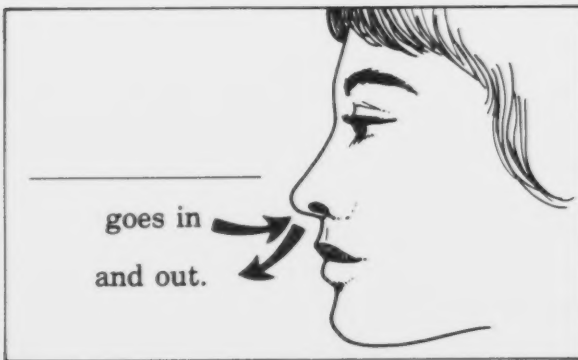
All the animals in one class get oxygen the same way. For example, all mammals have lungs and breathe air. The pictures show how animals in three classes get oxygen. Finish the sentences on each picture. Write *air* or *water* where it belongs.

Now think of a cat, bee, whale, and eel. They are in the same classes as the animals in the pictures. Which animals breathe the same way?

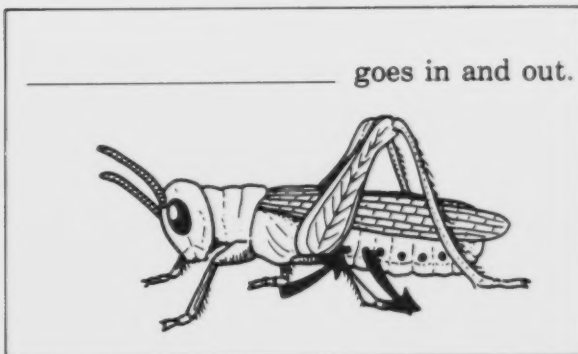
1. cat (page 17) and human
2. bee (page 14) and _____
3. whale (page 17) and _____
4. eel (page 17) and _____



Fishes breathe through their mouth and gill flaps. They have gills that take oxygen out of the water.



Mammals breathe through their nose. Mammals have lungs that take oxygen out of the air.



Insects breathe through holes on the sides of their bodies.

What foods do these animals eat? You can tell by their mouths. Name what you think they eat under the pictures.



Mosquito:



Woodpecker:



Human:

Different Ways to Eat

Animals eat different things. Some eat plants. Some eat other animals. Their mouths have different shapes.

Mosquitoes feed on blood. Their mouths are shaped like a needle. Mosquitoes push their mouths through the skin of an animal such as a human or a horse. Then they suck that animal's blood.

Woodpeckers eat insects that live inside trees. Their *beaks* are hard and pointed. Their tongues are long and sticky. They chip holes in trees with their beaks. Then they push their tongues into the holes to catch the insects.

Some animals have teeth. Meat eaters such as dogs have long, sharp, pointed teeth. Those teeth can hold and tear the flesh of other animals. What other animal has teeth like that?

Animals that eat plants may have sharp, wide teeth. The squirrel is an example. Its teeth can bite and chop up hard stems, roots, nuts, and fruits. What other animal has teeth like that?

Some animals feed on the leaves and seeds of grasses. Those animals have big, flat, wide teeth that can grind those foods. The horse has teeth like that. What other animal does too?

Now think of humans. We eat plants and animals. What kind of teeth do we have?

Built to Get Food

Animals that kill other animals for food are called *predators*. Predators have specialized body parts that help them find, hunt, trap, and catch their *prey*.

Some predators have strong bodies that can move with great speed. Look at the pictures on this page. Which animal can run very fast?

Right. The cheetah can outrun most other animals. It sneaks up on its prey. Then when it gets close, it dashes out and runs down the other animal.

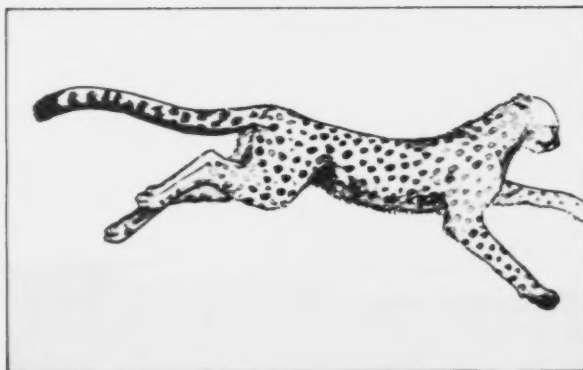
Some predators have *sense organs* that are very specialized. Those animals can see, hear, or smell their prey when it is far away.

Look at the picture of the bat. The bat hunts for insects. Which of its sense organs do you think is very specialized?

Right! The bat's ears are very specialized.

Bats don't see well. But they have a keen sense of hearing. They send out sounds that are so high, humans can't hear them. Those sounds travel through the air. When they hit the bat's prey, they bounce off and come back to the bat's ears. The bat can then tell where its prey is.

Hawks fly high in the sky, so high you almost can't see them. They hunt small animals that live on the ground. They dive quickly out of the sky and grab the animal before it can run for cover. What sense organ helps the hawk high in the sky find its food?



The cheetah is the fastest land animal. It can run up to 70 m.p.h. for short distances.

East Bay Regional Park District



The bat uses sound to find its prey. How are its ears specialized?

East Bay Regional Park District



Where is the lizard in this photograph?

Van Waters & Rogers



Where is the insect in this photograph?

Built to Get Away

Animals have specialized body parts that help them get food. They also have specialized body parts that keep them safe.

Some animals have special tough coverings that protect their bodies. The porcupine is an example. Its skin is covered with sharp quills that can cut the skin on a predator's nose or mouth. When the porcupine is in danger, its quills stand straight out. The porcupine now looks fierce, big, and dangerous. That frightens off the predator.

The turtle also has a tough covering — its shell. How does that shell keep the turtle safe?

Sometimes animals fool other animals by looking like something else. Scientists call that *mimicry*. For example, some moths have big circles on their wings. The circles look like the eyes of a large animal. That keeps the moths' enemies away. Some butterflies look like other butterflies that taste bad. Predators mistake them for those butterflies and leave them alone.

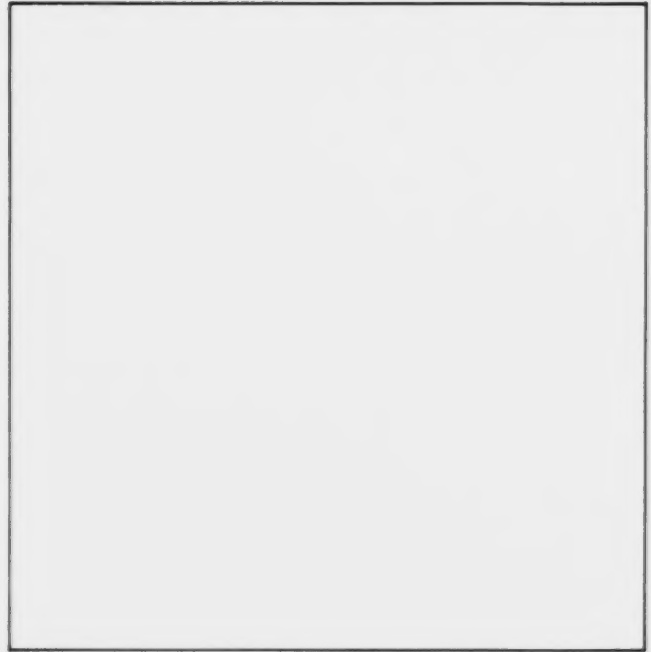
Some animals use mimicry in a different way. Their color and markings make them look like what they are on. When they stay very still, they look like sand or rocks, or twigs and leaves.

For two examples of mimicry, look at the photographs on this page. One photograph shows a lizard. And the other shows an insect. Can you find those animals in each picture? Draw a circle around them.

Animal Watch

Watch an animal for awhile. It can be an animal you are caring for or an animal that belongs to someone you know. It can also be an animal in a zoo.

Find out what that animal eats. Look at its mouth and other body parts. Try to see what is special about that animal's body. Write the name of the animal. Then answer the questions.



Name of animal: _____

1. How does the animal get oxygen?

2. What kind of food does it eat?

3. What are its mouth parts like? How do those parts help it eat food?

4. What specialized body parts help it get food?

5. What specialized body parts keep it safe from enemies?

In the space at the top of this page, draw one of the animal's specialized body parts. Write what that part is on your picture.

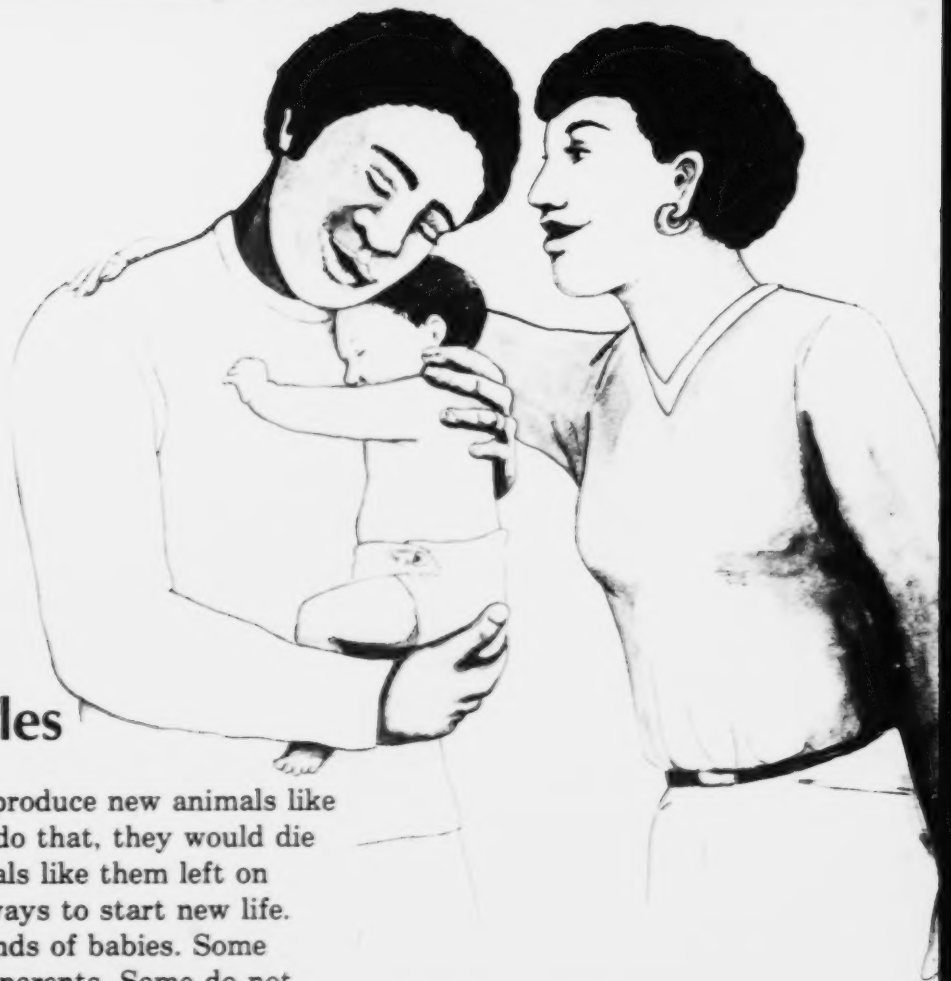
Check Yourself

Show what you learned in this unit. Finish these sentences. Draw a line from the words on the left to the correct words on the right.

- | | |
|---------------------------------------|------------------------------------|
| 1. Every animal has specialized body | a. eat only certain kinds of food. |
| 2. The animal's specialized body also | b. body parts such as sharp teeth. |
| 3. Gills help certain animals get | c. parts that help it get food. |
| 4. Lungs help certain animals | d. oxygen from water. |
| 5. Animal mouths are specialized to | e. keeps it safe from enemies. |
| 6. Predators have specialized | f. get oxygen from air. |
-

Check These Out

1. Find out what *sonar* is, and how bats use sonar. Then write a report about that information.
2. Pick an animal. Study its body. What specialized parts get oxygen? Find and eat food? Keep the animal safe? Find or draw a picture of that animal. Label its specialized parts and write what they do.
3. Collect pictures of animals that show them getting away from their predators. Post some pictures on a bulletin board in class.
4. Some animals, such as the opossum, play dead. Find out which other animals play dead. Tell your class about some of those animals.
5. Visit a zoo or pet store when the animals are being fed. Watch how different animals eat. Then report what you see to your class.
6. Here are more things you may want to find out:
 - What are carnivorous animals? Herbivorous animals? Omnivorous animals?
 - Who was Charles Darwin? What did he do? What is his *Theory of Evolution*?
 - What is *adaptation*? How do some animals adapt to different things?
 - How do corals eat?
 - What is venom? What are some animals that have venom?
 - How do different animals camouflage themselves?



Unit 4

Animal Life Cycles

Animals must be able to produce new animals like themselves. If they couldn't do that, they would die out. There would be no animals like them left on Earth. So, all animals have ways to start new life.

Animals have different kinds of babies. Some babies have bodies like their parents. Some do not.

- What different ways do animals produce new animals?
- What kinds of babies do different animals have?
- What different ways do animals grow up?

You'll find out in this unit.

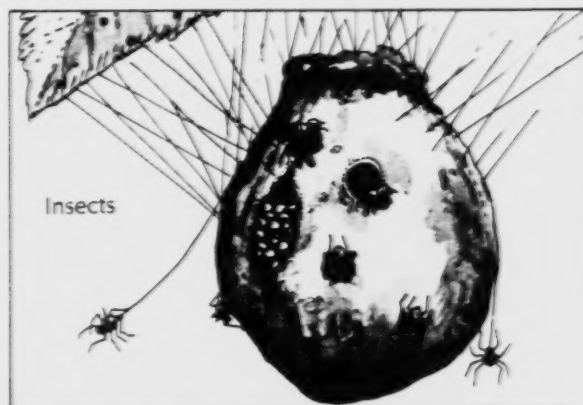
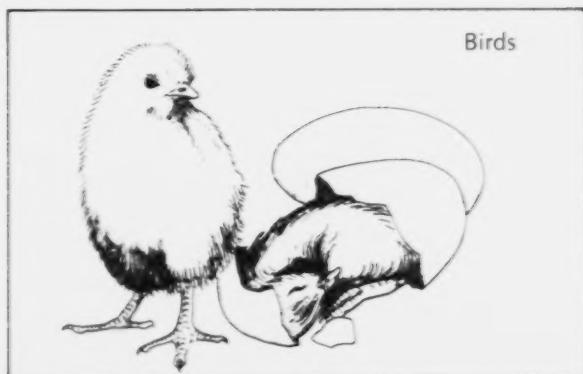
Before You Start

You'll be using the science words below. Find out what they mean. Look them up in the Glossary. On the lines below, write what the words mean.

1. develop _____

2. reproduce _____

3. stage _____



Starting Life

Animals *reproduce* in different ways. Some of them start new animals by *budding*. A special part — a *bud* — grows on the animal's body. The bud breaks off and *develops* into a new animal. Some sponges and coelenterates reproduce by budding.

But most animals reproduce *sexually*. In that kind of reproduction, a male and female must each produce sex cells. The female produces *egg cells*. And the male produces *sperm cells*. When a sperm cell *fertilizes* (joins) an egg cell, new life starts. The egg cell develops into a new animal.

Many animals that live in water fertilize the egg cells outside the female's body. The female pushes the egg cells out of her body. Then the male puts sperm cells on them.

Animals that live on land fertilize the egg cells inside the female's body. Some animals then *lay* the fertilized eggs. The young *develop* inside those eggs. They hatch out of the eggs when their bodies are completely formed.

Other animals *give birth* to living young. Those animals keep the fertilized egg inside their bodies. That egg slowly develops into a young animal. Then the young animal is born.

Look at the pictures on this page. How do those animals reproduce? Write *give birth* or *lay eggs* below.

birds: _____

mammals: _____

reptiles: _____

insects: _____

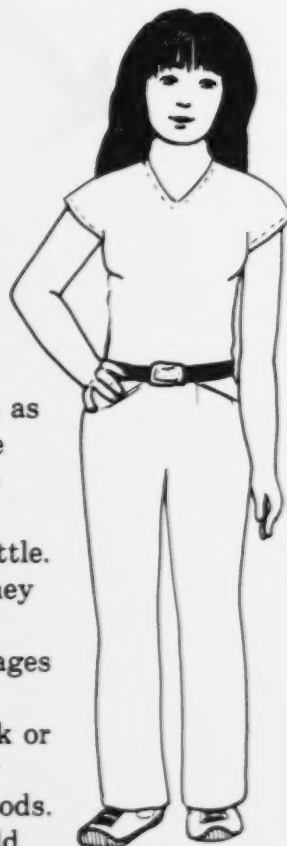
1. I _ _ _ _ _



2. C _ _ _ _ _



3. A _ _ _ _ _



4. A _ _ _ _ _



Growing Up

An animal's body goes through several stages as it grows. We call those stages its **life cycle**. Some animals' bodies change completely during the life cycle. Other animals' bodies change just a little.

Humans are animals whose bodies change a little. Our bodies don't change into a different form. They just get bigger as we grow up.

Look at the pictures. They show four main stages of the human life cycle:

Infant: Infants are baby humans. They can't walk or talk. They can't take care of themselves. They don't have teeth and must drink or eat soft foods.

Child: An infant grows bigger and becomes a child. Children can walk, run, and talk. They have teeth and can feed themselves. But they still need to be taken care of.

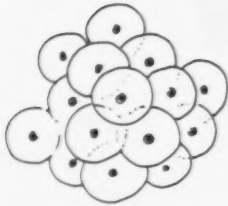
Adolescent: The child grows into an adolescent — a teenager. The person's body begins to develop sexually.

Adult: When adolescents finish growing, they are adults. They now can take care of themselves and their young.

Many other animals have life cycles like humans. They change just a little. What are some of those animals?

Now look at the pictures again. Write the name of each stage next to a picture.

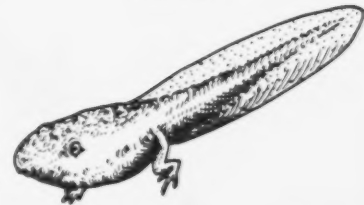
1. eggs



2. just-hatched tadpole



3. older tadpole with legs



Changing Bodies

Some animals' bodies change completely during the life cycle. Those animals have one kind of body when they are born and another kind of body when they are fully grown. We call that change *metamorphosis*.

Frogs go through metamorphosis. The pictures on this page show how the frog's body changes. Look at the pictures, then answer these questions.

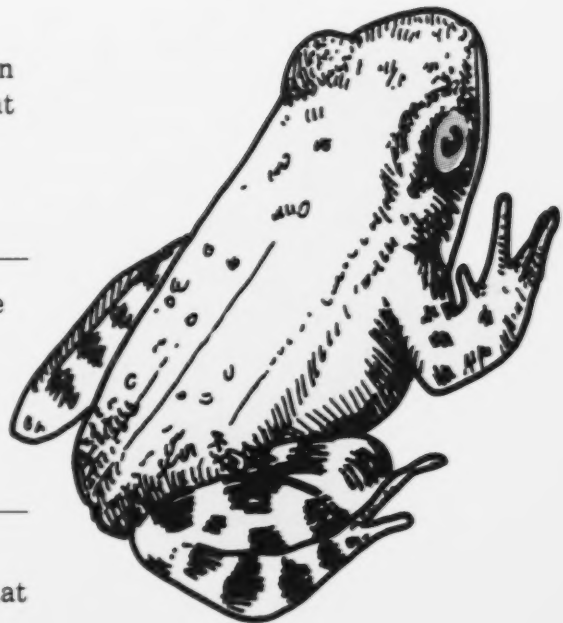
1. What is the first stage of a frog's life cycle?

2. Frogs hatch from eggs. When the eggs hatch, the baby animal looks and acts like a tiny fish. It swims in water and breathes with gills. It eats tiny plants. What is the animal called at this stage?

3. As the tadpole grows bigger, its body begins to change. New parts start to grow on its body. What are those parts?

4. The tadpole grows into an adult frog. Its body changes completely. The animal now lives on land. It eats insects. Its gills have changed to lungs. How else has the frog's body changed?

4. adult frog



Another Kind of Metamorphosis

You've learned that frogs have bodies that change completely. Butterflies and most insects also go through metamorphosis. But their metamorphosis is different in this way: It has one extra stage called the *pupa stage*.

The pictures on this page show the life cycle of a butterfly. Here are the stages:

Egg: The female butterfly lays eggs on the leaves of certain plants.

Larva: The eggs hatch and become *larva*. (The larva is also called a caterpillar.)

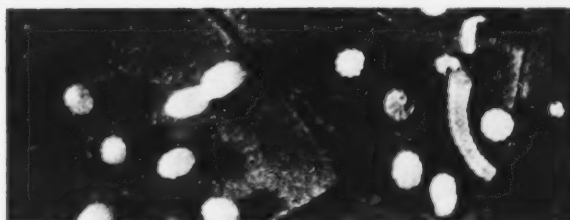
The larva stage is like the frog's tadpole stage. Look at the picture. What does the larva look like?

Pupa: The larva spends all its time eating leaves. It grows bigger. Then one day, it starts to change. Its body forms a hard shell — a *cocoon*. The animal is now in the pupa stage. Inside the cocoon, the larva's body slowly changes into a butterfly's body.

Adult: Now the butterfly's body is completely formed. The butterfly breaks out of the cocoon. How is its body different from the larva's?

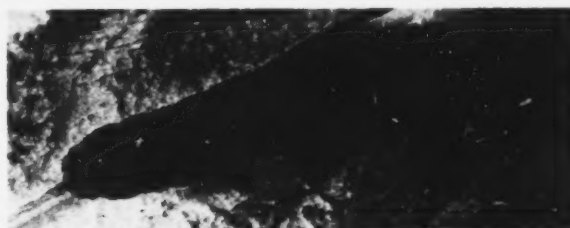
Look at the pictures again. Write the name of each stage under a picture.

The life cycle of a butterfly



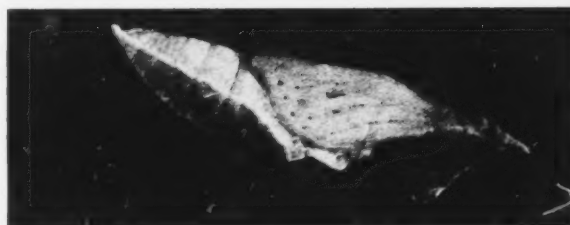
Joe Ogradnick

1. _____



Joe Ogradnick

2. _____



Joe Ogradnick

3. _____



Joe Ogradnick

4. _____

Check Yourself

Use words from this unit to do the crossword puzzle. The words you'll need are listed below.

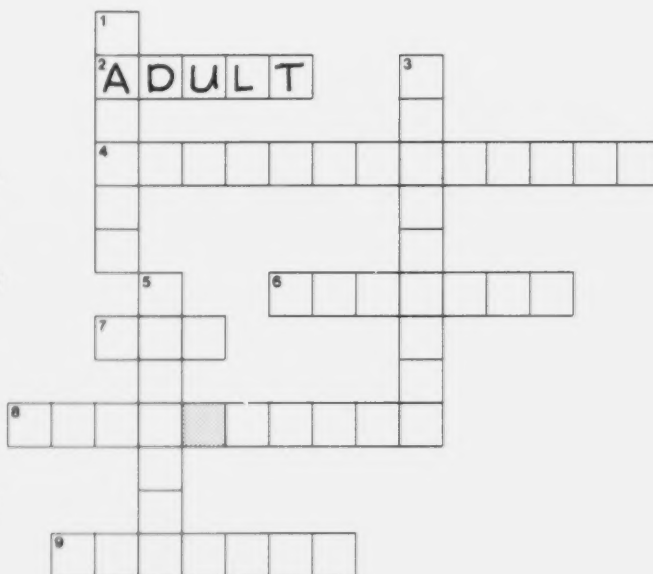
adult	life cycle	reproduce
budding	mammal	reptile
develop	metamorphosis	sex

Across

2. A full-grown animal.
4. A complete change of an animal's body.
6. One way sponges reproduce.
7. Special cells males and females make.
8. What an animal's body goes through as it grows from a baby to an adult.
9. This animal hatches out of an egg that its mother lays.

Down

1. This animal gives birth to living young.
3. To produce another animal.
5. To grow.



Check These Out

1. Put butterfly or moth eggs into a jar. When they hatch, feed the larva leaves. Cover the jar. (Be sure to make small holes in the cover for air.) Watch the larva change to an adult.
2. Get fish that lay eggs, such as angel fish. Get fish that give birth, such as guppies. Put them in the same tank. Watch their reproductive cycles.
3. Get pictures that show members of your family, from babies to adults. Put the pictures on a bulletin board. Group them so they show the four main stages of the human life cycle.
4. Kangaroos care for their young in a very interesting way. Find out about kangaroos.
5. Here are more things to find out:
 - How do different animals feed their young? Protect their young?
 - What animal has the shortest life cycle? The longest life cycle?
 - How long does a mother carry these animals before they are born: cat, elephant, human, whale?
 - How long do these eggs take to hatch: spider, chicken, lizard, turtle?



Unit 5

Animal Lifestyles

You learned that animals have different kinds of bodies. Those bodies are specialized to help the animals keep alive.

Animals also have different ways to live and act. Those ways are also specialized to help the animals keep alive.

Animals have many, many ways to do things. Scientists are still finding out about them. Special scientists watch the way animals live in the wild. Other scientists study the way animals act.

- What do scientists say about how animals act?
- What are some ways animals live?
- What are some ways animals care for their young?

You'll find out in this unit.

Before You Start

You'll be using the science words below. Find out what they mean. Look them up in the Glossary. On the lines below, write what the words mean.

1. behave _____

2. behavior _____

3. survive _____





How Animals Behave

The way an animal behaves is the way it acts. An animal behaves pretty much the same ways as other animals in its **species**. (A species is a group of just one kind of animal.) For example, all dogs have certain ways of acting. And all the birds in a species build the same kind of nest. Each kind of animal behaves in ways that help it survive.

Scientists who study animal behavior think this: When an animal is born, it already knows how to behave in certain ways. Scientists call those behaviors **instinctive behavior**. For example, spiders seem to know how to spin their webs. And human babies don't need to be taught how to suck milk. What do you think is another example of instinctive behavior?

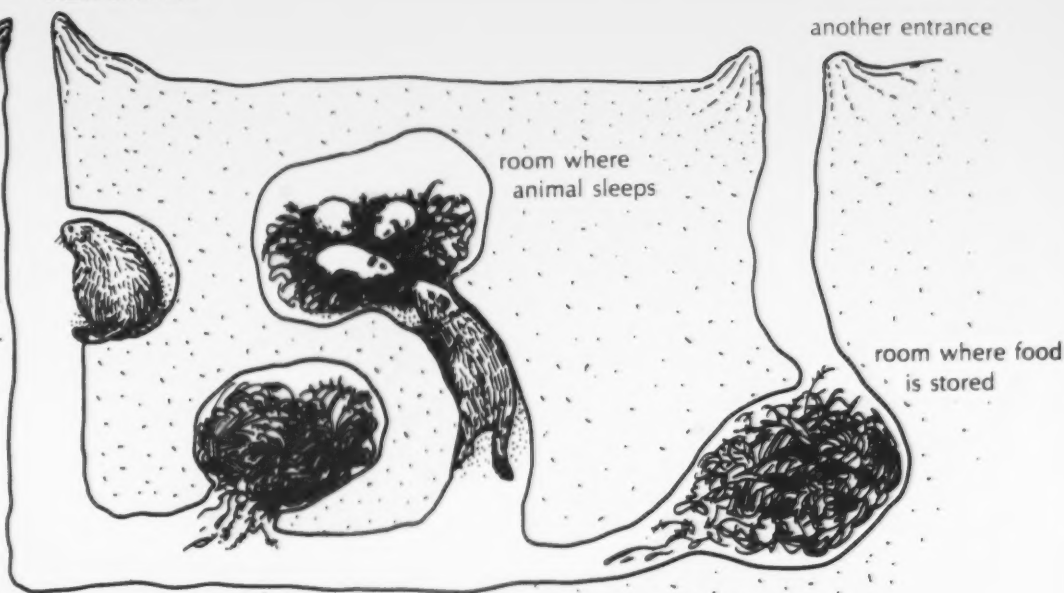
Scientists also think that an animal must learn how to do certain things. They call that kind of behavior **learned behavior**. For example, lion cubs seem to learn how to hunt by watching their mothers. And humans learn to talk by watching and listening to other people. What is another example of learned behavior?

Some animals can be trained to behave in special ways. Chimpanzees can be trained to start machines. Dogs can be trained to guide blind people. Dolphins can be trained to jump through hoops. What is another example of trained behavior?

Now think of an animal you are caring for. Could it be trained to do something? What could it do?



main entrance



Pocket gophers build homes with many rooms. They use the rooms for different things.

Different Ways to Live

Think of a fly. Now think of a honey bee. Both insects have different ways to live. One moves from place to place. And the other always goes back to a home. Which animal moves from place to place?

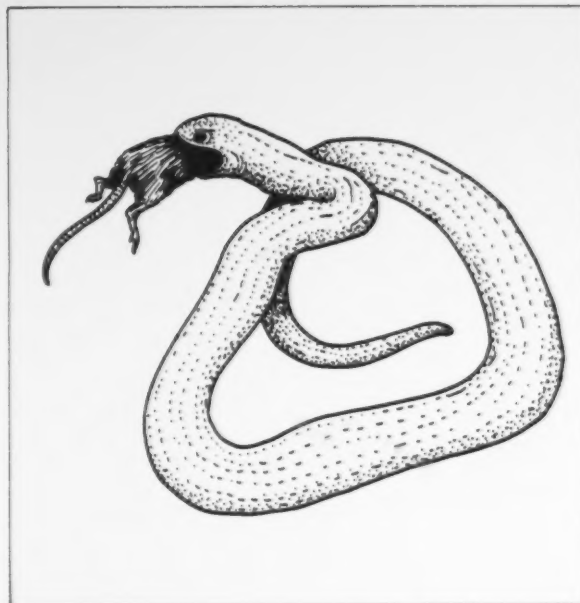
Right! The fly moves from place to place.

Many animals are like the fly. They don't have a special place that they always go to. They move around, looking for food. What's another animal that moves from place to place?

Other animals live in homes. Some of them live in places such as caves and holes in trees. Those are animals that find their homes. The bear is one example of an animal that does that. What's another animal that finds its home?

But many animals make their homes. For example, beavers build *lodges* with twigs and branches. Certain termites build huge dirt *nests*. Certain fish build *dens* with tiny stones. And animals like the pocket gopher dig *burrows* in the ground. What's another animal that makes its home?

Animal homes sometimes have many rooms. Humans make those kinds of homes. So do pocket gophers. Look at the picture on this page. How is the pocket gopher's home like a human home?



The rat eats insects. The snake eats rats.
What do you think eats snakes?

What's for Dinner?

All animals must eat. So, many animals spend a lot of their time looking for food.

Some animals move over large areas searching for food. Deer and bears are some of those animals. The deer searches for the kinds of plants it likes to eat. The bear looks for berries and other animals.

Animals that eat other animals must hunt or trap their prey. What are some animals that hunt for food?

Some animals hunt in groups. They work together to catch their prey. Several of them will run down a prey and kill it. Then they share it. Wolves and lions are examples of animals that hunt in groups.

Animals such as spiders wait for their prey to come to them. Then they trap them. The spiders' traps are sticky webs that they spin. Insects fly into the webs and are caught. The spiders then eat those insects.

Here's another way some animals get food: They *raise* it. For example, one species of ant "plants" a kind of mushroom in its nest. That mushroom is food for the ants. Another species of ant keeps aphids. Aphids are small insects. The ants protect and feed the aphids. The aphids make a sweet liquid that the ants eat.

What's another animal that raises plants and animals for food?

Bringing Up Baby

Suppose a baby snake just hatches from its egg. And suppose a baby bird does too. Can that snake take care of itself?

Can that bird take care of itself?

Right! The snake can survive as soon as it hatches. But a baby bird can't.

Some animals can survive by themselves when they are babies. Reptiles, insects, and most animals that live in water are like that.

But other animals must be cared for by adults until they are big enough to survive. What are some of those animals?

Adults care for their young by feeding them. Some animals hunt for their babies. They bring the food back to their young. Mammals make milk in their bodies and feed it to their young.

Adults also care for their young by protecting them. They hide their young in places that are hard to find. They attack other animals that come near. Some animals also do this: They trick other animals into following them away from the young.

Adults care for their babies until the young animals are almost grown up. A deer mouse takes about six weeks to grow up. So it stays with its mother for six weeks. A raccoon stays for up to a year. How long do humans care for their young?

L.K. Couch, U.S. Fish & Wildlife Service



A mother opossum carries her babies on her back. She keeps them safe. The young opossums leave their mother when they are about four months old.



The large insect in the center is the queen bee. She lays eggs. The bees around her are worker bees. They feed the queen and take care of her.

Getting Along

Many animals don't have much to do with other animals. They live alone most of their lives. They are with other animals in their species only when they mate and raise young.

But some animals like to live close to others like them. They form large groups. For example, fish swim in *schools*. Birds form *flocks*. And wolves form *packs*.

Some animals also form a special kind of group called a *society*. The animals in a society act with each other in certain ways. Sometimes they help each other. Sometimes they do certain jobs.

Honey bees are insects that live in a society. They live in a *hive*. Each bee does a certain job. Some bees gather and make food. Others clean and protect the hive, and so on.

Humans live in a society. So do most monkeys. Watch the monkeys in a zoo. See how they behave with each other.

Sometimes an animal lives with an animal of another species in a special way. Scientists call that **symbiosis**. Here's an example of symbiosis: A kind of crab always carries a sea anemone on its shell. When the crab eats, some of its food also feeds the anemone. When an enemy comes near, the anemone protects the crab with its stinging cells.

There is one animal that lives with many different kinds of animals. That animal cares for them and keeps them as pets. What animal is that?

Animal Watch

Study a wild animal. It could be one that lives outdoors, such as raccoons, fish, birds. It could be one that lives in your school or building, such as cockroaches, spiders, or mice. It should not be a pet or an animal that lives in a zoo.

Draw a picture of that animal at the top of this page. Write the name of the animal on your picture. Then answer these questions.

1. What phylum (or subphylum) does that animal belong in? (If you're not sure, look through unit 2.)

2. Where does that animal live?

3. What does it eat?

4. How does it get its food?

5. How does it behave when it gets its food?

6. How does it behave when it sees or notices you?

Animal: _____

Check Yourself

Fill in the missing word. Use one of the words below. The first is done.

hunt	learned	societies
instinctive	move	survive

1. Most animals know how to do certain things when they are born. That behavior is instinctive.
2. Some animal behaviors are _____. Those behaviors are taught to animals.
3. Some animals _____ from place to place. Others live in homes.
4. Animals that eat other animals _____ or trap their prey.
5. Some animals can _____ as soon as they're born.
6. Humans, bees, ants, and certain monkeys live in _____.

Check These Out

1. Many groups of birds *migrate* (move) to warmer climates. Where do some birds migrate to? When do they migrate? Give a report to your class.
2. Certain animals *hibernate* during cold seasons. Find out what *hibernation* is. What animals hibernate?
3. *Aesop's Fables* are stories about animals. Read one of those stories and tell your class about it.
4. Rudyard Kipling wrote many funny stories about how animals got their body parts. Find out one story. Draw a picture strip that tells the story.
5. Find out about honey bees. How do they form a new beehive? What is life like in the beehive? What do the queen bee, workers, and drones do?
6. Here are more things to find out:
 - What are some ways different animals find their mates?
 - Why do scientists believe dolphins have their own language?
 - Why did the astronauts take bees with them on a space shuttle flight? What did the astronauts learn?
 - Who is Jane Van Lawick Goodall? What animal did she study? What did she find out?

Unit 6

Animals in Danger

Animals have specialized bodies that help them survive. They have specialized behaviors that also help them survive.

But sometimes a whole species of animals has trouble surviving. Large numbers of those animals die. The ones that live can't reproduce fast enough. Soon there are fewer and fewer of those animals. And then one day, there are no more.

- What do animals need in order to survive?
- How does a species survive?
- What causes a species to disappear?

You'll find out in this unit.

Before You Start

You'll be using the science words below. Find out what they mean. Look them up in the Glossary. On the lines below, write what the words mean.

1. **balance** _____

2. **endangered** _____

3. **environment** _____





The Right Conditions

We all live in an *environment*. That environment is made up of everything around us. It is made up of the land we live on and everything on the land. It is also made up of all the other living things — plants and animals — that live with us on the land.

An animal must get everything it needs from its environment. If it can't, it won't survive. What do animals need in order to survive?

Animals need food and water. They need places where they can be safe from predators. They need places where they can mate and raise their young.

Many different kinds of living things share an environment. They must all get what they need from the same environment. When all the living things can get what they need, we say the environment is *balanced*.

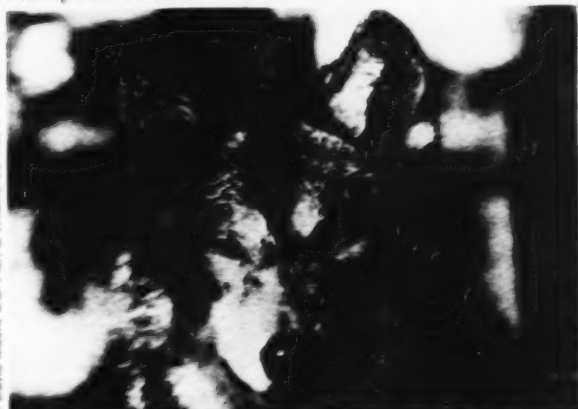
The number of animals is always about the same in a balanced environment. Here's why: A certain number of animals die. But, at the same time, about the same number of animals are reproduced.

Sometimes, something upsets the balance of an environment. For example: Suppose most of the predators in an environment are killed. The animals they would eat now have few enemies. So fewer of them would die. One species of those animals could begin to reproduce quickly. Soon too many of those animals are in the environment.

What do you think could then happen to that species of animal? Why?



Humpback whale



Timber wolf



Bald eagle



Grizzly bear

Endangered Species

You will never see a live passenger pigeon. That species is extinct. But about a hundred years ago, flocks of those birds lived in the United States. Every year, human hunters killed thousands of them. And the species died out.

A species can die out if it is over hunted, the way the passenger pigeons were. It can die out if its environment is suddenly changed. And it can die out if its environment becomes polluted with harmful chemicals.

Scientists fear that many species today are endangered. In an endangered species, too many animals die. Not enough are reproduced.

The animals shown on this page are all endangered. The sentences below tell why. Read the sentences. Then name the animals you think they describe.

1. This big mammal lives in the oceans. Humans hunt it in huge ships. Its meat is used to feed humans and pet animals.

2. This bird is the symbol of the United States. Human hunters and ranchers killed many of it. Chemicals such as pesticides are polluting its environment.

3. This big mammal is one of Earth's large meat eaters. Human hunters kill it for sport. Humans are also changing its environment quickly.

4. This mammal lives in packs. It is related to the dog. Humans kill it for its fur. They also kill it because it is a predator. Humans are taking over its environment.

Animal Watch

Find out about an endangered species. Choose one from the pictures on the other page. Or, choose another endangered species that you have heard about.

Learn as much as you can about the animal in that species. Read news stories or books. Talk to people in conservation groups. Talk to scientists, veterinarians, biologists, science teachers, etc. Find the answers to these questions:

1. What is the name of the animal?

2. What phylum does it belong to?

3. What are some body traits of the animal's species?

4. What are some behavior traits of the species?

5. How does the species protect itself?

6. How does it get its food?

7. What kind of environment does it live in?

8. Why is it endangered?

Show What You Learned

What's the Answer?

Put an X in front of the right word or words. There may be more than one correct answer to a question.

1. What are some traits of all animals?
_____ a. Must eat food.
_____ b. Most can move freely.
_____ c. All have a backbone.
2. What is a trait of a phylum?
_____ a. Has an outside skeleton.
_____ b. Classifies animals.
_____ c. Has fur or hair.
3. How do specialized body parts help an animal? They:
_____ a. Bring oxygen into its body.
_____ b. Keep it safe from predators.
_____ c. Help it find food.
4. How do animals reproduce?
_____ a. Budding.
_____ b. Laying eggs.
_____ c. Giving birth to young.
5. What are animal behaviors?
_____ a. Building a nest.
_____ b. Having a backbone.
_____ c. Learning to talk.
6. How is a species endangered?
_____ a. It moves freely.
_____ b. Its environment is polluted.
_____ c. It is overhunted by predators.

What's the Word?

Write the correct word for each meaning.

1. To put into groups
C _____
2. The certain ways an animal looks or acts
T _____
3. To keep alive
S _____
4. An animal that kills other animals for food
P _____
5. Body changes from a baby to an adult
L _____ C _____
6. To act in a certain way
B _____

Congratulations!

You've learned a lot about animals.
You've learned:

- about the main kinds of animals;
- how animals are alike and different;
- how animals survive; and
- many other important facts about animals.

Glossary

bal ance To give all living things what they need.

be have To act in a certain way.

be hav ior A way of acting.

bo dy ca vi ty The space inside a body.

cir cu la to ry sys tem The parts in an animal that move food, oxygen, and other things throughout its body.

class A group of animals such as birds, insects, and mammals.

clas si fy To put into groups.

de vel op To grow.

di ges tive sys tem The parts in an animal that digest (break down) food.

en dan gered To be in danger of dying out.

en vi ron ment All the land and living things that make up a place.

ex o skel e ton The hard covering on certain animals' bodies. An outside skeleton.

ex tinct When one kind of animal dies out and none is left on Earth.

fer til ize To join a male and a female sex cell and make a new life.

in stinc tive be hav ior A way of acting that an animal is born with.

learned be hav ior A way of acting that an animal is taught to do.

life cy cle The different body changes an animal goes through from baby to adult.

pred a tor An animal that kills other animals for food.

prey An animal that is killed for food.

re pro duce To produce new animals.

sci en tif ic name The name that all scientists use to describe an animal.

seg ments Small sections.

spe cial ized Having special body parts. Acting in special ways.

spe cies A group of just one kind of animal. Humans make up a species.

stage A period of time in an animal's life.

struc ture The shape and parts of an animal's body.

sur vive To keep alive.

sym bi o sis When two kinds of animals live together and help each other.

ten ta cles Thin, moving parts that are used like arms.

traits The certain ways an animal looks or acts.

ver te brate The backbone inside an animal's body.

warm -blood ed Being able to make and keep the same body heat.

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